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PROMOTING SHARED RESPONSIBILITY FOR ANTIQUITIES PRESERVATION IN EGYPT



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Reform Design and Implementation Unit

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RDI REPORTS

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Report No. 125

***PROMOTING SHARED
RESPONSIBILITY FOR
ANTIQUITIES
PRESERVATION IN EGYPT***

*A Strategy for Reducing Impacts Associated
with Irrigated Agriculture and other Land Uses*

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BACKGROUND

PROBLEM

Irrigation and drainage practices in Luxor and elsewhere have contributed to a rise in the water table and high salt concentrations in surface soils. Consequently, corrosive groundwater is in direct contact with temple foundations for extended periods of time, causing structural damage to foundations, columns, and walls and visible degradation of artistic features. Many of these impacts are *irreversible*. This problem has existed for many years at the temples of Karnak, Luxor, and Medinat Habu; but the rate of degradation has increased dramatically in recent years. Moreover, irrigation impacts on antiquities can be seen at many other locations in Egypt and are frequently compounded by inadequate municipal sewage systems. No comprehensive list of threatened Egyptian antiquities currently exists, but sites known to be damaged by groundwater include Old Cairo, Abydos, Esna, and Maimonides Synagogue, among others.

CULTURAL SIGNIFICANCE OF EGYPT'S ANTIQUITIES

It is difficult to assess the value of cultural heritage; how can one adequately describe the importance of art and sacred places? Yet we know that Egypt's antiquities are appreciated by people of all nations as cultural heritage of global significance. These antiquities inspire awe, reflect the universal need to worship a higher being, and are objects of beauty - - each a powerful force for renewing the human spirit. The gods, goddesses, and saints depicted in Egypt's sacred places represent universal archetypes recognized by many cultures throughout time, albeit in different forms and names. Although many are no longer worshipped and have been replaced by other religions, their stories provide insight into the fundamental nature of humankind. Both Freud and Jung, some of the most highly respected psychologists of the 20th century, believed that the archetypes represented in ancient Egyptian mythology hold the key to understanding the rich tapestry of the human psyche and human relations.

For these reasons, several Egyptian antiquities have been designated as UNESCO World Heritage sites. These include the Pyramids, Ancient Thebes, Nubian monuments from Abu Simbel to Philae, Islamic Cairo, and Abu Mena. This list continues to grow, as 16 more sites have been proposed for inclusion, yet existing and potential World Heritage sites represent a very small portion of Egypt's cultural heritage endowment. Considered by many to be the birthplace of civilization, the intrinsic beauty and value of Egyptian antiquities and the large number of ancient sites comprise a wealth that is incomparable. This unique endowment carries tremendous challenges and responsibilities to safeguard it for current and future generations.

ECONOMIC IMPORTANCE OF EGYPT'S ANTIQUITIES

Antiquities are one of Egypt's most important economic resources, evident by current statistics on the tourism sector's contribution to the national economy. According to a June 2000 study completed by the Egyptian Center for Economic Studies, tourism revenues comprise 4.4 percent of Egypt's GDP (\$3.6 billion). Adding indirect effects, the total contribution reaches 11.6 percent of GDP (\$9.6 billion). Equally important, foreign tourists' spending directly and indirectly supports 2.7 million jobs in various economic sectors (12.6 percent of the total work force), generates 5.1 percent of taxes (L.E. 3.6 billion), and is fast becoming Egypt's most important source of foreign currency. These figures are far more than previously thought. Indirect impacts reflect the fact that tourism spending creates demand in other sectors, which in turn creates other cycles of spending and consumption. These figures provide an more accurate assessment of tourism's contribution to the economy by accounting for important linkages. Although antiquities are not the country's sole tourist attraction and therefore can not claim all the economic benefits associated with tourism, Egypt's unique endowment of cultural heritage largely drives the tourism sector.

Globally, tourism along with information technology, is expected to lead economic activity in the next two decades, with a growth rate in job creation 1.5 times that of any other industrial sector, including petroleum and textiles. Egypt's antiquities are an economic asset and should be managed accordingly. Tourism revenues provide a rationale for antiquities preservation and can be used to support management efforts. However, the challenge remains to implement an effective and comprehensive strategy for antiquities preservation.

THE ENVIRONMENTAL SETTING FOR ANTIQUITIES IN THEBES

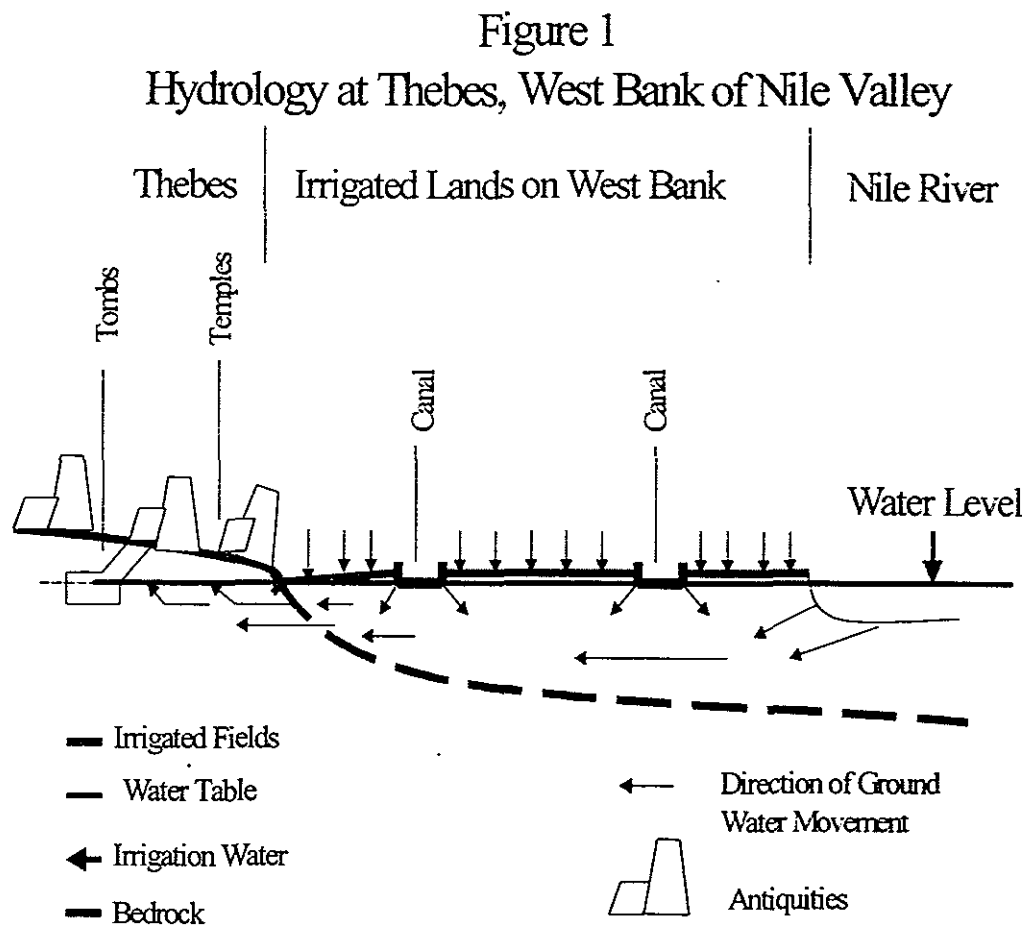
Historic Nile Valley Conditions

From ancient times, the Nile River annually overflowed its banks and flooded the valley. The river would begin rising in July, reach its peak in August, and begin receding in September, followed by a long dry period. Most pharaonic monuments are located just above the flood line, with the exception of Karnak and Luxor Temples on the East Bank of the Nile at Thebes. However, seasonal flooding caused minimal damage because the floods lasted only a few months and the monuments were allowed to dry out.

Current Nile Valley Conditions

Construction of the High Aswan Dam in the mid-twentieth century drastically changed the environmental setting at Thebes. The dam and subsequent irrigation system made year-round cultivation possible. Valley sediments are now subject to near-constant irrigation and the Nile River is maintained at a significantly higher level. This has resulted in inadequate drainage, a slow accumulation of groundwater, and associated rise in the *water table* (the top of the groundwater aquifer).

To understand this water regime more fully, refer to Figure 1, an idealized cross-section of the West bank of the Nile Valley at Luxor, looking downstream. The Nile is on the right side of the diagram and the antiquities are on the left. Note that the river banks are a little higher than the outside edge of the valley floor, which is typical of valleys formed by large rivers bearing sediments. Due to this slope, seepage from the Nile River bed tends to flow toward the valley margins, where the monuments are situated. This seepage, combined with on-farm application of



irrigation water and seepage from irrigation canals, is causing the water table to rise. Many temples and tombs are now standing in water or continually damp from *capillary* action. Capillary action occurs wherever the water table is within a few meters of the base of monuments; the dry stone structures act as wicks, drawing moisture up through the soil and stone. As this water evaporates, salts accumulate on the structures.

Predominant Land-Use Patterns in Thebes

Antiquities on both the West and East banks of the Nile River at Thebes are surrounded by mixed housing and urban development and agricultural lands. Refer to Figure 2 for a map of the West Bank. Buffer zones between antiquities and other land uses are non-existent; in fact, it is

common to see antiquities situated in cultivated fields and many of the unexcavated antiquities lie beneath houses and fields. Illegal housing settlements are prevalent on both sides of the river and the associated sewage contributes to existing groundwater problems. In addition, it is widely known that those squatters who have constructed their houses on top of ancient graves are typically engaged in looting and selling.

Sugar Cane Cultivation

Sugar cane is the predominant crop in the Luxor region, comprising 65 percent of the land under cultivation (24,000 of 42,000 feddans). This pattern reflects current government policies, market conditions, and horticultural factors. Sugar cane consumes substantially more water than cotton and other crops, up to 12,000 cubic meters of water per feddan per year. However, farmers prefer to grow sugar cane because the government provides irrigation water free of charge and sugar cane is easy to cultivate and market relative to other crops. The marginal cost of a cubic meter of water is limited to the fuel costs associated with pumping the water from the canal, so farmers have little incentive to consider water consumption when determining their cropping patterns. In addition, the ease of sugar cane cultivation allows farmers to engage in other income-earning activities. Last, the many sugar factories located throughout Upper Egypt contract with farmers to purchase all sugar cane produced at a fixed price. Farmers use the contracts with sugar factories to secure loans for agriculture inputs. Sugar cane is the only crop in Egypt to have this kind of marketing support and price stability.

Prior to 1990 the Government determined cropping patterns, set prices, and purchased all output under a quota system. Farmers had few choices. Egypt has since moved toward a free market economy and farmers can now plant whatever they want. Legal reforms that would prevent negative externalities have not caught up with these recent policy reforms. Individual farmers are not subject to environmental impact assessment (EIA) requirements and are largely free to cultivate any crop of their choice almost anywhere, provided that they can secure access to the land. The only known exceptions include rice cultivation, which is limited to governorates in the delta, and sugarcane cultivation, which is prohibited within 200 meters of any road. The purpose of the sugarcane "buffer zone" is to reduce potential hiding areas for terrorists who may target travelers.

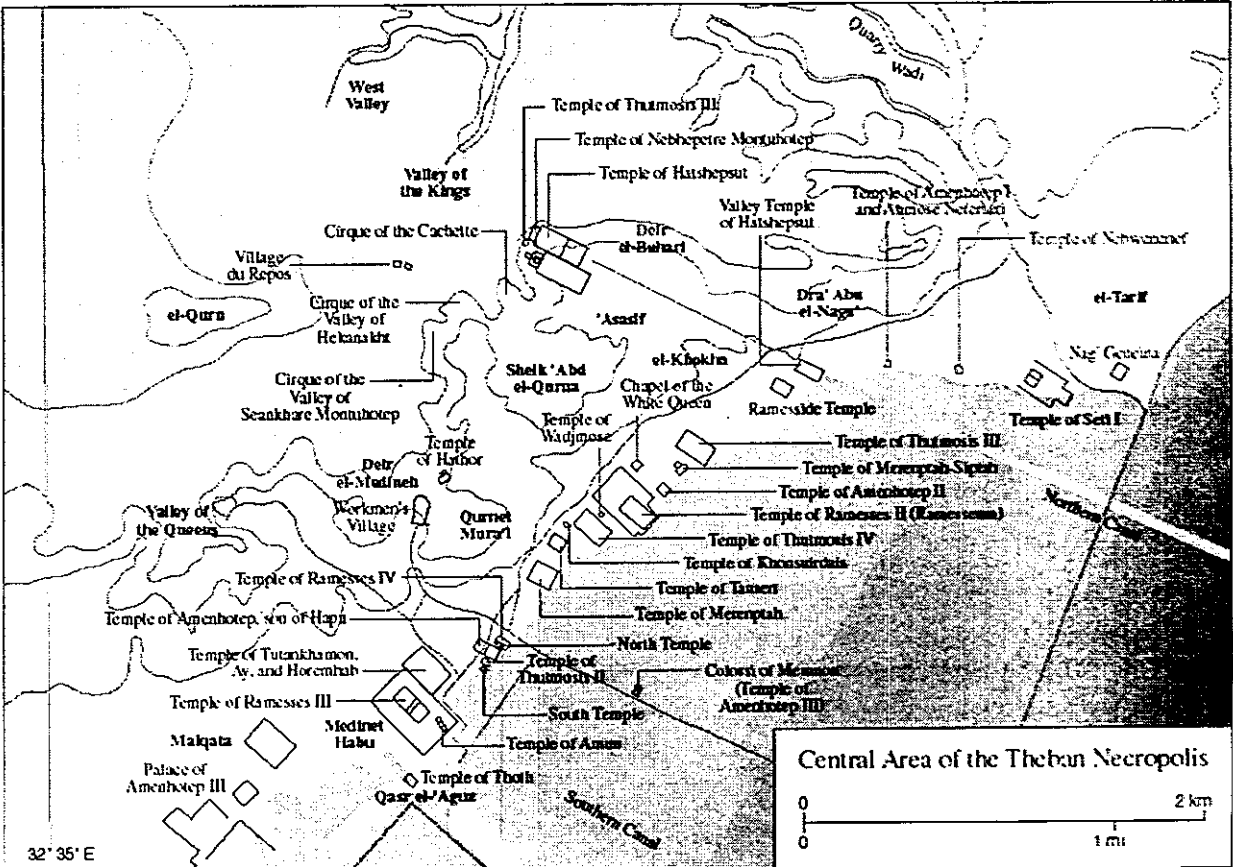
Preliminary hydrological studies conducted by the Egyptian Groundwater Research Institute and SWECO International at Karnak and Luxor temples indicate that irrigation of sugar cane on the East Bank is the predominant cause of the groundwater impacts observed at these temples. Sewage from illegal housing development adjacent to Karnak is a contributing factor, but less important.

Illegal Housing

Approximately 2,000 families live in illegal housing in the Theban necropolis on the West Bank, near the frontage road. There is no collection and disposal system for the sewage from these habitations. Each house has a septic tank, but once full the tank overflows and the partly settled

Using conservative estimates of 5 liters water consumption per capita per day and 2,000 families comprising 10,000 people - - 50,000 liters or 50 cubic meters of sewage water percolates into the groundwater within the confines of the Theban necropolis each day. This is a significant amount and easily accounts for the dampness and dark staining of the ground surface below many of the houses and the presence of sewage water in recently uncovered tombs.

Figure 2



[insert a key that describes color codes, i.e. green for cultivated land]

CURRENT FRAMEWORK FOR ANTIQUITIES PRESERVATION

IMPORTANT CONSIDERATIONS

Egypt's unique endowment of antiquities and its causes of degradation have several features that must be taken into account in the design of an effective management strategy.

- Antiquities are threatened by both on-site and off-site activities, and
- The number of antiquities is very large, they are often located in remote areas, and many are still undiscovered or inadequately inventoried.

Therefore, antiquities preservation must be a *shared responsibility*. It is beyond the capacity of any single agency to ensure the protection of Egypt's antiquities. Each private sector firm and public sector agency must take responsibility for ensuring that its actions do not result in unacceptable impacts. This requires preparation of an adequate *environmental impact assessment* (EIA). An EIA identifies potential impacts of a proposed development project during the design phase, so that mitigation measures can be incorporated into project design before the project is approved. It is the primary mechanism for addressing off-site impacts and sharing responsibility for antiquities preservation.

- Antiquities vary in importance, as do impacts.

Therefore, antiquities preservation requires an ability to identify resource management priorities.

- Antiquities degradation reflects a conflict between three competing resources: land, water, and antiquities.

Therefore, antiquities preservation requires a capacity land-use planning. *Land-use planning* helps balance diverse development objectives within a region, taking into account the cumulative environmental impacts of proposed land uses. The planning process also provides a mechanism for resolving competing resource uses.

- Egyptian antiquities are both cultural and economic assets and need to be managed accordingly.

Therefore, antiquities preservation requires capacities for economic analysis. *Economic analysis* helps assess which sites are a high priority for preservation based on the economic benefits associated with local tourism relative to other potential land-uses (of course, other criteria may also be important). In addition, it helps identify the most cost-effective solutions. Egypt is very fortunate in that it reaps tremendous tourism revenues from its cultural resources. These revenues provide an economic rationale for their protection and a means for financing preservation activities. This is very significant because it is unique relative to conditions in most other countries. Unlike Egypt, most protected areas management programs (whether for natural or

cultural sites) have difficulty generating significant revenues and thus face tremendous financial constraints. The authors do not suggest that Egypt should assume sole responsibility for paying for protection of its cultural heritage sites, but simply wishes to emphasize that many site management activities and preservation measures are potentially self-financing.

CURRENT LEGAL AND POLICY FRAMEWORK

This section provides an overview of the legal and policy framework for antiquities protection. It highlights the most relevant clauses of the Egyptian Antiquities Protection Law, UNESCO guidelines for World Cultural Heritage Sites, and Egyptian Guidelines for Environmental Impact Assessment. It also briefly discusses the current status of land-use planning and land titling in Egypt.

The Egyptian Antiquities Protection Law

The 1983 Antiquities Protection Law (No. 117) defines what constitutes an antiquity and the State's role in antiquities preservation. It sets regulations for notification of discovery, registration, ownership, search and excavation, exhibition in museums, trade, protective measures, and penalties for illegal activities. This law supercedes all previous antiquities laws (No. 215 of the year 1951), as well as any conflicting regulations.

All antiquities are considered public property (Article 6). Antiquities are registered by a decree from the Ministry of Culture, published in the Egyptian Official Gazette, and noted in registers of the Real Estate Publicity Administration and the Antiquities Authority (currently known as the Supreme Council of Antiquities)(Articles 12 and 14). Lands owned by individuals may be expropriated for their archeological importance (Article 18).

The following legal clauses are most relevant to reducing agricultural impacts on antiquities (these have been paraphrased):

- The Antiquities Authority is entitled to obtain title to land near archaeological sites to preserve their aesthetic characteristics and protect their environmental setting. This "buffer zone" may extend for 3 kilometers from the antiquity in uninhabited places, or to the distance determined to be necessary by the Authority to protect the antiquity. (Articles 3, 16, 19, and 20).
- Other parties are prohibited from digging irrigation and drainage canals, cultivating or preparing for cultivation, or otherwise changing the characteristics of archeological lands and buffer zones except with a license from the Supreme Council and under its supervision (Articles 20 and 43).

- The Antiquities Authority shall record archeological sites on maps and provide these to local Antiquities Inspectorates and urban planning authorities so that they may be considered in planning processes. Moreover, the Authority shall prepare a register of environmental and urban development factors effecting every archeological site and assess its importance (Article 26).
- The Antiquities Authority shall promote coordination with other government authorities involved in planning, housing, tourism, and other sectors at the national and governorate levels, to guarantee the protection of historical and archeological environments from leakage, pollution, and other sources of damage (Article 51).

Convention Concerning the Protection of the World Cultural and Natural Heritage

In 1974 Egypt became a signatory to the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), adopted by UNESCO in 1972. By signing, Egypt and other parties to the convention made the following commitment:

Each State Party to this convention recognizes that the duty of ensuring the identification, protection, conservation, presentation, and transmission to future generations of the cultural and natural heritage situated on its territory belongs to primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and cooperation, in particular, financial, artistic, scientific and technical, which it may be able to obtain. (Article 4)

The 1972 convention is augmented by several more detailed guidelines for preservation of cultural heritage. These are useful references for assessing the legal and policy framework for antiquities preservation in Egypt. They include:

- Recommendations Concerning the Safeguarding and Contemporary Role of Historic Areas (1976);
- Recommendations Concerning the Protection at National Level of the Cultural and Natural Heritage (1972);
- Recommendations Concerning the Preservation of Cultural Property Endangered by Public or Private Works (1968);
- Recommendations Concerning the Safeguarding of the Beauty and Character of Landscapes and Sites (1962); and
- Recommendations on International Principles Applicable to Archeological Excavations (1956).

It is the responsibility of each party to the convention to incorporate these guidelines into their nation's cultural heritage law. Examples of recommendations for ensuring antiquities preservation at the national level include the following:

- *A plan should be prepared for the protection, conservation, presentation and rehabilitation of groups of buildings of historic and artistic interest. It should include peripheral protection belts (buffer zones), lay down the conditions for land use, and specify the building to be preserved and the conditions for their preservation. This plan should be incorporated into the overall town and country planning policy for the areas concerned (33).*
- *Enforcement of protection measures should apply to individual owners and to public authorities.*
- *Central and local authorities should, as far as possible, appropriate in their budgets a certain percentage of funds, proportionate to the importance of the protected property forming part of their cultural or natural heritage, for the purposes of maintaining, conserving and presenting protected property of which they are the owners, and of contributing financially to such work carried out on other protected property by the owners, whether public bodies or private persons (49).*
- *Universities should organize regular courses on the history of art, architecture, the environment, and town planning (60).*
- *Continuing efforts should be made to inform the public about what is being and can be done to protect the cultural or natural heritage and to inculcate appreciation and respect for the values it enshrines (61).*

Egyptian Environmental Impact Assessment Guidelines

In accordance with the 1994 Law for the Environment (No. 4) and a 1995 Prime Minister's Decree (no. 338), all new projects and expansions or renovations of existing projects must have an environmental impact assessment (EIA) before a permit is issued by the "Competent Administrative Authority" (CAA). Examples of CAAs include the Ministry of Water Resources and Irrigation; Ministry of Agriculture and Land Reclamation; Ministry of Housing, Reconstruction, and Urban Communities; Ministry of Industry and Mineral Resources; and Ministry of Transportation, among others. The purpose of an EIA is to help the developer and the CAA identify potential negative impacts of proposed projects before a project has been approved, so that strategies to reduce or mitigate negative impacts can be incorporated into the project's design.

In 1996 the Egyptian Environmental Affairs Agency (EEAA) published general EIA guidelines which apply to both public and private sector projects. EIA requirements vary according to the class of the proposed project:

White List projects are expected to have minor environmental impacts and require a simple Environmental Screening Form (Form A) based on existing information. Examples include proposed expansion of existing irrigation and drainage structures of 10 percent or less.

Grey List projects are expected to have major environmental impacts and require an Environmental Screening Form (Form B) and possibly a scoped EIA that focuses on specific impacts identified in the screening phase. Examples include land reclamation projects of 400 feddans or less and proposed expansion of existing irrigation and drainage structures of more than 10 percent. Environmental Screening Form B requires a description of archeological and historical areas, potential impacts on hydrology and drainage, and any consultations with public authorities or stakeholders regarding the project, among others.

Black List projects require a full EIA. Examples include hotel or resort facilities in environmentally sensitive areas and historical areas, new irrigation projects, land reclamation programs of more than 400 feddans, and urban development projects. The sectoral guidelines for land reclamation projects and for irrigation and drainage programs list "impacts on historic and cultural sites" in the list of potential impacts to be addressed and mentions "control of encroachment into natural protectorates" as an example of a mitigation measure that may be necessary.

The general EIA guidelines produced in 1996 include preliminary sectoral guidelines which highlight the most common and significant impacts in each sector. EEAA is now producing more detailed sectoral guidelines which can be used to develop terms of reference for the preparation of a full EIA. Sectoral guidelines have been completed for land reclamation projects, marinas and ports, industrial estates, sewage treatment plants, and tourism. Sectoral guidelines for cement manufacturing, electricity generation, pharmaceuticals, and petroleum are currently in progress. Both the general and sectoral guidelines list antiquities as one of the potential impacts to be assessed. If an EIA document identifies a potential impact on an antiquity, EEAA requires that the developer obtain a permit from the Antiquities Organization.

Egyptian Land-Use Planning and Land Titling Laws

Land-use planning is not widely practiced in Egypt. It is possible that the Ministry of Local Development engages in land-use planning, as it oversees development activities at the governorate level. However, the study team was unable to confirm this. The closest examples of land-use planning found by the study team include feasibility studies prepared for land reclamation projects and the Comprehensive Development Plan for the City of Luxor, financed by the Ministry of Housing and United Nations Development Program (UNDP). Several officials indicated that the government imposes few restrictions on land uses of privately owned land, particularly in the agriculture sector. The most prominent exceptions are land-use restrictions in sensitive coastal areas and "natural protectorates".

Evidence suggests that land titling procedures in Egypt are onerous and land is frequently sold based on a verbal contract or informal court registration, without official registration of a change

in title. Informal contracts are recognized by local officials. Local cooperative offices maintain a current registry of farm land that identifies the owners and tenants recognized by the predominant informal system. It is unclear how much land is cultivated by farmers who do not have land-use rights (formal or informal), or who engage in prohibited agricultural activities near antiquities.

CURRENT INSTITUTIONAL ROLES AND RESPONSIBILITIES

Building upon the idea of shared responsibility, the following agencies and stakeholders currently engage in activities that support antiquities preservation or have significant opportunities to reduce negative impacts. The description of each agency focuses on roles most relevant to antiquities preservation, with special reference to reducing impacts associated with irrigated agriculture. It is not a comprehensive description of the full range of responsibilities and activities undertaken by each agency.

Government Agencies

Supreme Council of Antiquities, Ministry of Culture

The Ministry of Culture issues decrees which recognize individual cultural heritage sites as "antiquities" under the Antiquities Protection Law. It also approves the operating budget of the Supreme Council of Antiquities (SCA). The SCA is the lead agency for antiquities preservation and has primary responsibility for enforcing the Antiquities Law. Formerly an independent agency, it is now under the authority of the Ministry of Culture. The SCA maintains a registry of known antiquities and is in the early stages of establishing a Geographic Information System (GIS) to manage antiquities data. Once developed, the GIS will enable SCA to produce detailed maps of archeological sites and their environmental setting, which can be used by people involved in the preparation of EIAs and land-use plans to identify potential impacts. In addition, SCA is responsible for issuing permits for development activities on antiquities lands and for monitoring subsequent on-site activities during the implementation phase to assess if unacceptable impacts are occurring.

The SCA maintains field offices at a large number of antiquities sites, particularly those that attract tourists. For example, in the Luxor area local antiquities officials include the General Director of Antiquities, Inspectorate of Qurnah (West Bank), and Chief Inspectors for the West Bank, Luxor Temple, and Karnak Temple. Inspectorates oversee site management, including excavation activities and tourism, among others. They also collect revenues from ticket sales and remit them to the Ministry of Finance for inclusion in the General Fund.

Ministry of Agriculture and Land Reclamation (MALR)

MALR advises farmers on cropping patterns for existing farm land, based on expected profitability and water consumption needs. In addition, it provides extension services to assist farmers with land leveling and other practices to improve farm productivity. MALR also

maintains close coordination with the Ministry of Water Resources and Irrigation (MWRI) by informing MWRI of proposed cropping patterns, so that MWRI can ensure delivery of an adequate volume of irrigation water to farms.

The MALR in Luxor Governorate provide an example of how governorate level activities are coordinated. The MALR has two Directors of Agriculture Administration encompassing 23 villages and two districts: Luxor District and City of Luxor. In addition, an Extension Manager is assigned to each of 4 village groups, comprised of about 5-6 villages. Every village has a Farmers' Association. MALR holds a Local Committee Meeting every 15 days to coordinate activities. Extension Managers hold a weekly meeting. When necessary, the Governor sponsors a meeting of farmers to discuss a specific problem identified by the Ministry.

Within MALR, the **General Authority for Reclamation Projects and Agricultural Development (GARPAD)** prepares plans and feasibility studies for new land reclamation projects, based in part on an extensive World Bank-funded soils survey that identifies undeveloped land suitable for cultivation. In early 2000, GARPAD established an EIA Department to prepare EIAs for proposed land reclamation projects. A director has been appointed who is now seeking technical assistance to make the department operational.

Ministry of Water Resources and Irrigation (MWRI)

MWRI plans, installs, and maintains irrigation and drainage infrastructure up to the border of the farm. Farmers are responsible for all on-farm irrigation infrastructure. MWRI recently announced that it plans to establish an EIA Department to prepare EIAs for proposed irrigation and drainage projects.

MWRI also oversees the delivery of irrigation water according to a set schedule. Water is released in the main canals once every 7 days. The Ministry does not charge farmers for irrigation water nor monitor on-farm consumption.

The **Egyptian Groundwater Research Institute** within MWRI's National Water Research Center contracts with other agencies to conduct hydrological field studies. They have recently conducted several studies for SCA at Karnak, Luxor, and Abydos temples.

Egyptian Environmental Affairs Agency (EEAA)

EEAA has two departments that are relevant to antiquities preservation: the EIA Central Department and the Department of Natural Protectorates. In addition, EEAA has 6-7 Regional branch Offices at the governorate level.

The **EIA Central Department** prepares general and sectoral guidelines for conducting EIAs and reviews EIAs completed on proposed private and public sector projects. The Ministry is required to review all EIAs and provide the Central Authorizing Agency (CAA) with its opinion of the adequacy of the EIA within 60 days of receipt. The EEAA registers submission of each EIA

document, its opinion of the EIA, and its recommended mitigation measures into an EIA register. As mentioned earlier, both the general and sectoral guidelines list antiquities as one of the potential impacts to be assessed. If an EIA document identifies a potential impact on an antiquity, EEAA requires that the developer obtain a permit from the Antiquities Organization.

The CAA either rejects the project, approves the project on the condition that the developer complies with the recommended mitigation measures, or defers its decision and requires the developer to prepare a more thorough EIA. The CAA forwards a copy of its decision to the EEAA, which registers it in the EIA Register. The CAA ensures implementation of the decision, including mitigation measures. Public Sector projects follow the same procedures; however, in these cases the developer is also the CAA (for example, when the Ministry of Agriculture proposes a new land reclamation project, it is the CAA); thus the EIA is prepared by the same agency that makes the decision regarding project approval.

EEAA presently receives approximately 1,000 EIAs each month. Most EIAs are screening forms (Form B) and almost all EIAs are for private sector projects. EIAs for public sector projects in Egypt are limited to projects financed by donor agencies, because the relevant line ministries (CAAs) are just beginning to establish internal procedures for preparing EIAs on their own projects and programs.

As with most environmental regulations, the Ministry's focus to date has been on improving public awareness of EIA requirements, not enforcement. Regulations generally have extensive grace periods to allow people time to adjust. EEAA adopts a collaborative approach and seeks to support efforts to conduct EIAs. For example, they "invite" developers to submit an EIA and work with developers to improve project design whenever potential impacts are identified. They do not engage in monitoring and enforcement nor take steps to halt projects with negative impacts, but will increasingly move in this direction. Currently, when projects are stopped this is a political decision made at the highest levels of government.

EEAA has negotiated a policy benchmark with USAID to have EIAs submitted for 25 percent of all public sector projects by 2002. Highest priority is assigned to the agriculture, irrigation, and construction sectors, which are believed to have the most significant impacts. To meet this goal, EEAA plans to disseminate EIA guidelines and provide training to relevant ministries (CAAs), supported by the USAID-funded Egyptian Environmental Policy Program (EEPP).

The primary mechanism for collaboration between EEAA and other ministries is through the normal EIA screening process, whereby EIA consultants are expected to consult the Supreme Council of Antiquities to determine if any antiquities exist within a proposed project site. If antiquities are known to be present or are discovered and reported during site development, the developer may need to obtain a permit to continue activities. The SCA does not generally review EIAs nor monitor on-site activities; consequently, it is unclear how EEAA determines if an EIA has adequately addressed potential antiquities impacts.

To promote integration of EIA capacities within other government ministries, EEAA recently established an inter-ministerial working group. As of September 2000, the list of ministries to be included had been drafted, but individual representatives of each ministry had not yet been identified. In addition, the Minister of Agriculture sits on the Environment Ministry's Board of Directors.

To help EEAA handle the expanding workload associated with EIA reviews, EEPP consultants recommend that EEAA increasingly focus on EIAs for large projects, Area EIAs that address cumulative impacts, and other "strategic" EIAs. In conjunction, they recommend that EEAA increasingly devolve responsibility for reviewing EIAs for smaller projects to Environmental Management Units at the Governorate level.

In accordance with Law 102, the **Department of Natural Protectorates** oversees protected areas management. Egypt currently has over 20 designated protectorates. These generally comprise *natural* heritage sites, with the exception of St. Catherine's Monastery, a proposed UNESCO World Cultural Heritage site. The department is mentioned in this report because effective strategies for protected areas management are largely the same as strategies for antiquities preservation. They both require capacities for site management, EIAs, and land-use planning. Moreover, Egypt's most important antiquities sites need to be viewed and managed as protected areas.

Other Government Agencies

The **Ministry of Tourism** promotes and oversees for tourism development. The **Ministry of Housing, Reconstruction, and Urban Communities** plans for new housing development and associated sewage infrastructure. The **Ministry of Local Development** is responsible for rural and urban development activities at the Governorate level. This includes sewage systems for existing housing development. **Governors** hold monthly meetings of representatives of all the different ministries, to help coordinate their activities at the Governorate level. In Luxor, this is referred to as the High Council. The Council meets more frequently when there is need to solve a particular problem, and establishes special committees to monitor implementation of agreed solutions.

International Organizations Focused on Preservation of Cultural Heritage

UNESCO World Heritage Committee

The UNESCO World Heritage Committee oversees the process whereby cultural heritage sites deemed to be of "outstanding universal value" and are thereby designated as "World Cultural Heritage" property. This designation brings several benefits. First, World Heritage properties are eligible to receive seed money from the *World Heritage Fund* to implement preservation strategies. More importantly, the UNESCO endorsement helps governments mobilize other funds by elevating the status of a particular site.

The World Heritage Committee also reportedly maintains a *List of World Heritage in Danger*, comprised of World Heritage sites that require major operations to secure their protection and for which assistance has been requested under the Convention by the relevant state party. Ironically, if a state party fails to adequately protect a World Heritage site in accordance with the Convention, UNESCO can withdraw the designation. However, UNESCO does not generally monitor compliance nor impose this penalty on negligence.

UNESCO Cairo Office

The UNESCO Cairo Office oversees UNESCO's activities in the Arab region. Within Egypt, UNESCO administers an Egyptian Fund and a Nubian Fund. Interest earnings from these funds finance technical assistance, training, and/or equipment aimed at antiquities preservation and museum development. UNESCO typically focuses on specific requests from the Ministry of Culture for assistance. In addition, the Cairo Office has also established a Groundwater Protection Committee for the Arab Region.

Other International Organizations Focused on Antiquities Preservation

Several other organizations are listed in the UNESCO Convention. These include the *International Center for the Study of the Preservation and Restoration of Cultural Property* in Rome, the *International Council of Monuments and Sites* (ICOMOS), and the *World Conservation Union* (IUCN: formerly "International Union for the Conservation of Nature") in Gland, Switzerland. The study team did not conduct further research to determine what role these organizations may play in antiquities preservation in Egypt, but mentions them for the record.

Related Donor-Funded projects

Several donor-funded projects are currently involved in activities that have a potential to strengthen the institutional and policy framework for antiquities preservation in Egypt. These are briefly described below.

SIDA-funded Groundwater Studies (SWECO International)

The Swedish International Development Agency (SIDA) has contracted SWECO, a Swedish firm, to conduct and/or oversee several groundwater studies at temples in Luxor and elsewhere. SWECO subcontracted some of the preliminary field studies to the Groundwater Research Institute (GRI), and institute within the National Water Research Center. GRI reported the initial finding that the rising groundwater table at Karnak temple is largely attributable to extensive sugarcane cultivation in the vicinity of the temple. Field work for a follow-up study at Luxor and Karnak temples, conducted by GRI and overseen by SWECO, is expected to begin shortly.

USAID-funded Agriculture Policy Reform Program (Development Alternatives, Inc.)

This report was prepared by DAI under the Research, Design, and Implementation component (RDI) of APRP. RDI/APRP works with several ministries within the GOE, including the MALR and MWRI, to promote the process of privatizing and liberalizing the agricultural economy. RDI has a component to promote improved land and water resource use. Pending approval of USAID and the Government of Egypt, the study team is prepared to provide additional technical assistance needed to implement proposed follow-up actions. Technical assistance would be closely coordinated with the on-going SWECO study.

World Bank-funded Irrigation Improvement Project

The Ministry of Irrigation has tentatively agreed to use existing World Bank project funds to finance the installation of gated-pipe irrigation systems on 250,000 feddan in Upper Egypt, including all land under sugarcane cultivation in Luxor.

USAID-funded Egyptian Environmental Policy Program (International Resources Group)

As stated earlier, the Environmental Policy Program plans to help EEAA disseminate EIA guidelines within Government and private sector. For example, the program is helping to establish an inter-ministerial EIA Working Group, including decision-makers and technical staff of EEAA, MALR, Housing, and other agencies. Its purpose will be to provide staff from different agencies an opportunity to meet each other, facilitate broad-based "ownership" in the EIA process, disseminate information, promote problem-solving, and help agencies internalize guidelines.

In July 2000, project consultants completed a report entitled, "A Conceptual Framework for Area-Wide Environmental Assessment, with Special Reference to Irrigated Agriculture in Egypt." The project plans to produce a second report focusing on priority actions to strengthen the EIA process, including legal reforms, institutional arrangements, and measures to address cumulative impacts, among others. It will also produce a policy paper on area wide EIAs, including government projects. These are expected to be completed by February 2001.

USAID-funded Groundwater Control Projects for Old Cairo and Maimonides Synagogue

USAID is financing several groundwater studies at other cultural heritage sites in Egypt. These focus on sewage impacts.

USAID-funded Secondary Cities Project (Camp Dresser McKee)

The Secondary Cities Project focuses on improving sewage infrastructure in secondary cities throughout Egypt, including the housing development adjacent to Karnak Temple.

UNDP-funded Comprehensive Development for the City of Luxor Project (Abt Associates)

The Comprehensive Development for the City of Luxor Project represents one of the first attempts to facilitate a local land-use planning process in Egypt. The Final Structure Plan describes six proposed development projects deemed to be a high priority by local stakeholders who participated in the project. It is unclear if investment funds will be forthcoming from the private sector, Government of Egypt, and/or donor organizations.

The Final Plan contains an environmental profile for the City of Luxor. It notes that any future project in Luxor must consider aesthetic and cultural impacts, among others. It further states that negative impacts on *monuments and their settings* need to be minimized and that studies should be conducted during planning and excavation phases to determine if development activities will uncover historic artifacts.

Embassies

Consistent with the list of donor-funded projects above, both the Swedish Embassy and United States Embassy are currently supporting antiquities preservation in Egypt. Beyond this, the U.S. Ambassador has hosted several meetings to discuss critical issues and has reportedly helped raise private sector funds in Egypt and New York to finance preservation activities.

Non-Governmental Organizations

Sugar Crops Council (SCC)

The Sugar Crops Council is a non-governmental organization that promotes sugarcane cultivation, processing, and marketing in Egypt. SCC signs purchase agreements with individual farmers for their expected sugarcane yields. Farmers are able to use these "futures contracts" to secure loans for agriculture inputs. All sugarcane is processed in SCC-owned factories and sold for domestic consumption. Farmers are assessed a fee in exchange for SCC's services. Sugarcane is the only crop in Egypt to have this kind of support. Consequently, other crops are more difficult to market and suffer greater price fluctuations.

SCC, in cooperation with the MALR and RDI Unit, has a program to promote improved sugar cane on-farm irrigation. The SCC provides interest free loans to farmers to install gated pipe irrigation to reduce water applications to sugar cane by about 25 percent. (The program is to be expanded rapidly through the World Bank funded Irrigation Improvement Project within the MWRI.) SCC also provides laser land-leveling services and gives plowing equipment and other large machinery to farmers' associations, which then lend it to individual farmers.

Archeological Research Institutes and Universities in Egypt

Archeological research institutes are engaged in restoration and preservation activities at numerous sites in Egypt and are thus very knowledgeable of impacts. They are in a unique position to raise public awareness of existing and potential threats. In addition, they frequently help solicit donor funding. For example, the Egyptian Antiquities Project of the American Research Center in Cairo (ARCE) is working with other donors and government agencies to address groundwater problems at Old Cairo, Maimonides Synagogue, Luxor Temple, Medinat Habu, and Abydos. Similarly, the German Institute of Archeology is working at Abu Mena and Abydos. An ARCE study will commence in October 2000 to determine the extent of structural damage at Luxor Temple from groundwater.

Other archeological institutes in Egypt include the Austrian Archeological Institute, French Institute of Oriental Archeology, Italian Cultural Institute, Netherlands Institute for Archeology and Arabic Studies in Cairo, Czech Republic Institute of Egyptology, Polish Center of Archeology, Swiss Institute, and the Center for Conservation and Preservation of Islamic Architectural Heritage.

Several Egyptian universities have programs in Egyptology. Egyptology Departments have few if any courses in antiquities preservation and site management. However, with curriculum development they could begin to play an important role in building capacities for antiquities preservation in Egypt.

RECOMMENDATIONS

RECOMMENDED TECHNICAL SOLUTIONS

The following technical recommendations focus on measures to lower the water table in Thebes. They include both engineering solutions and policy changes. With modifications to account for differences in local conditions, these strategies could be suitable for mitigating impacts from irrigation at other antiquities sites in Egypt. The first four recommendations focus on strategies that improve drainage and de-water the top one to two meters of the soil profile. These are followed by recommendations for significantly lowering the water table and changing the direction of groundwater flow, to provide more permanent protection from groundwater impacts.

Strategies to Improve Drainage and De-water the Top Two Meters of Valley Sediments

- *Encourage farmers to install gated pipe irrigation systems.*

The APRP project has implemented a pilot program to test gated pipe technologies on sugar cane farms in the Luxor area. Initial results from village leaders who participated in the pilot program indicate a 40 percent reduction in water application and increased crop yields associated with improved drainage. Other farmers in the area have expressed interest in this new system and MIWR has indicated that funds from the World-Bank financed Irrigation Improvement Project have been set aside to convert 250,000 feddan of sugar cane in Upper Egypt to gated pipe systems.

- *Consider establishing buffer zones around antiquities for which preservation is a high priority.*

The size of the buffer zone needed for protection at any particular site and the types of activities that can take place within the buffer zone without resulting in significant impacts will be a function of local environmental conditions (hydrology, topography, etc.) and cumulative impacts from other adjacent land uses. Thus, it would be most effective to tailor buffer zone specifications to local conditions, rather than establishing a single rule on buffer zones for all sites. Note also that it is much easier to establish a buffer zone before development has taken place than to try to change existing land uses. A high priority should be placed on establishing buffer zones around sites that are threatened by encroaching development.

The Antiquities Protection Law provides for the establishment of buffer zones. In addition, the government has already implemented a "buffer zone" policy for security reasons: sugar cane cultivation is prohibited within 200 meters of any main road to eliminate cover for potential terrorists.

- *Encourage farmers to switch to less water-consuming crops.*

The most effective means for encouraging wise use of water resources is to price water at its full cost. The authors understand that this policy reform is technically, as well as politically, difficult to implement and therefore unlikely. An alternative strategy is to restrict the production of high water-consuming crops, as the government has attempted to do with rice in some regions. Such a strategy would be most important in the areas immediately adjacent to antiquities, particularly in buffer zones.

▪ *Reduce seepage from irrigation canals and improve drainage.*

Several unlined tertiary irrigation channels are located in the Theban antiquities area on the West Bank: the Ramses Canal, Farhana Branch Canal, and El Fadiliya Canal. The portion of the Ramses Canal that parallels the main Theban access road, comprising about 0.75 kilometers, is enclosed in a reinforced concrete box-culvert. MWRI should consider authorizing and budgeting for the lining of the remaining four kilometers of this canal, where it crosses immediately in front of the Theban necropolis. This would eliminate seepage from its bed and banks. The Farhana Branch Canal can easily be terminated at the beginning of a branch of the El Qibli Drain so that it does not cross the front of the necropolis. In the event of excess flow at the end of this canal, it would simply spill into the El Qibli Drain and return to the Nile. The El Fadiliya Canal is sufficiently far enough from the necropolis and no action is recommended.

According to government officials, the agricultural area from the El Fadiliya Canal to the Ramses Canal has or will soon have shallow tile drains installed. Larger diameter collector mains carry the drainage water to outlets at the Nile, where it is discharged. Drainage engineers working in the area believe that a significant source of the high groundwater affecting Medinat Habu is the small vale of irrigated farmland immediately southwest of the temple. This area does not yet have sub-drains. This area, comprising about 60 feddans, should be included in the geophysical investigations outlined later in this report. If it is found to be contributing to the high groundwater under Medinat Habu then it should be treated with some form of drainage.

A shallow drainage system, properly installed and maintained, will provide adequate drainage for the root zone, the top 1 to 1.5 meters of valley sediments. It will not effect drainage at deeper levels.

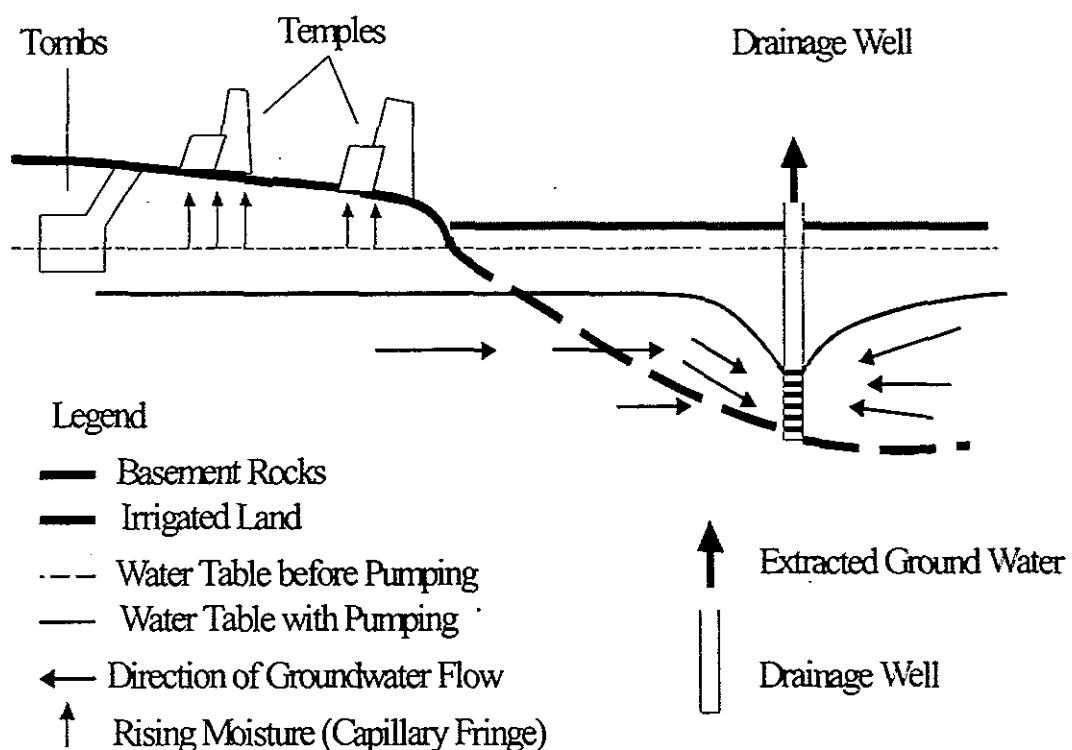
Strategies to Lower the Water Table and Reverse the Direction of Groundwater Flow

▪ *Conduct further field studies to design and install proper groundwater extraction wells.*

As is evident in Figure 1, the whole profile of valley sediment is saturated with groundwater. Antiquities protection requires that the water table is lowered sufficiently so that moisture can not reach the foundations through capillary action. The most effective and easiest means to lower the water table is to install large drainage wells with electrically driven pumps to intercept and remove the deeper groundwater. Such wells produce 'cones of depression' in the water table, thereby lowering the water table and causing the groundwater to seep slowly toward them from considerable distances. Their 'zone of influence' can extend for hundreds of meters. Refer to

Figure 3, which depicts a single well installed 200 meters from the edge of the necropolis. A line of drainage wells across the front of the necropolis would form a hydraulic barrier to further intrusion of groundwater, while gradually lowering the water table under and around the threatened antiquities. This 'barrier wellfield' technique has been used successfully in many parts of the world.

Figure 3
A Drainage Well's Effects on Ground Water



Cisterns have been used successfully at Dendara and Abydos temples to lower the water table in their immediate vicinity; however, such wells have a very small zone of influence and thus require installation of many wells on a tight grid throughout the temple site. The advantage of larger groundwater extraction wells is that they can be located off-site because they have a large zone of influence.

Concerns have been expressed that groundwater extraction wells will extract soil particles from under the temple foundations, resulting in settlement and potential structural damage. This is a risk with *well-point* systems, in which a site is temporarily encircled with a ring of small-

diameter wells prior to installing a foundation under wet conditions. Such wells are pumped hard by a vacuum pump to quickly lower the water table. The deep drainage wells recommended must not be confused with a well-point system. These are relatively large diameter with properly sized gravel filters and well screens that will remove only water. They will be sited at distances far enough from the antiquities and pumped at sufficiently low rates that groundwater lowering under and around the Theban necropolis will proceed in an even manner. Another concern is that removal of the groundwater will *itself* create weakness in the foundation soils. Soil mechanics and foundation engineering theory and practice have proven that a dry soil is inherently more stable than a saturated one.

It is essential that any well system be properly designed, installed, and operated. A clear picture of the underground conditions in the area where the wells will operate is needed to determine optimal well spacing, sizing, and pumping schedules to obtain the desired results. Egypt is most fortunate in having the Groundwater Research Institute (GRI), which is fully capable of conducting field studies and groundwater modeling. This involves using non-intrusive geophysical methods to map the full depth of valley sediments in the area of interest, choose a location for a test well, conduct the necessary pumping tests, and use the data from this work to develop a mathematical model which can be used to arrive at an optimal layout for the well field. This process is further described in an annex titled "Outline of Steps Involved in Execution of Groundwater Investigations, Test Pumping, Well Design, and Monitoring for the Theban Barrier Wellfield."

An Interim Strategy for Mitigating Sewage Impacts

- *Install municipal sewage holding tanks in squatters settlements on the West Bank.*

The most desirable solution to this problem, the departure of the squatters from their homes, is not going to occur in the near future. Thus an interim solution is needed. Installing sewers and a small treatment plant in hilly terrain directly over tombs (many still undiscovered), would be excessively expensive and disruptive. It would also encourage squatters to stay indefinitely and risk damaging tombs while trenching for sewer lines. An interim solution would be to pipe the effluent from groups of domestic septic tanks to larger municipal holding tanks, where it could be pumped out on a regular basis by vacuum trucks and hauled away for proper treatment. A strategy that both intercepts sewage and lowers the groundwater protects antiquities from above and below.

RECOMMENDATIONS FOR STRENGTHENING THE INSTITUTIONAL AND POLICY FRAMEWORK

The following recommendations focus on measures to coordinate preservation efforts, particularly those aimed at preventing potential future impacts or worsening of existing impacts.

- *Establish a mechanism for coordinating antiquities preservation activities between relevant Government Agencies, possibly at both the governorate and national levels.*

This could be a new mechanism or build upon existing mechanisms, which include monthly meetings sponsored by the Governor of Luxor, the Antiquities Working Group sponsored by the U.S. Ambassador, and the EIA Inter-Agency Working Group recently established by the Ministry of Environment.

- *Hold a conference in Luxor to raise public awareness and bring various stakeholders together to solve problems jointly..*
- *Support MALR's and MWRI's efforts to build capacities for conducting EIAs on proposed agriculture sector projects.*

Next steps include identifying staffing needs, hiring staff, developing guidelines and procedures for preparing EIAs (building upon relevant guidelines produced by EEAA), establishing policies on how EIAs will be reviewed and used in decision-making processes, and training.

- *Develop detailed instructions for integrating antiquities considerations into EEAA's general EIA guidelines and sectoral EIA guidelines, possibly in the form of an Annex.*

It is expected that this annex would be relatively brief and simple, providing step-by-step instructions on how to determine potential impacts on antiquities in consultation with the SCA, and how to design effective mitigation measures.

- *Establish criteria for determining which sites are highest priority for preservation.*

Site priorities could be based on both economic and cultural heritage criteria. In addition, criteria could be developed to prioritize interventions, taking into account the importance of individual sites, severity of threats, ease and cost-effectiveness of potential mitigation measures, etc.

- *Conduct a survey of local antiquities inspectorates and research institutes to compile a list of antiquities sites known to be threatened by groundwater or other impacts.*

The survey would initially focus on high priority sites, list existing and potential threats, and provide a preliminary assessment of the severity of each threat. This could be presented in a simple matrix. It could be followed by a more detailed survey involving site visits, as needed.

- *Provide technical assistance for curriculum development on environmental impact assessment and antiquities site management for Egyptian Universities and Government Agencies.*
- *Explore ways to strengthen public finance for antiquities preservation.*

As mentioned earlier, many of Egypt's antiquities generate substantial tourism revenues which could be used to finance preservation activities; however, the budget of the Supreme Council of Antiquities does not seem to reflect the economic value of the resource it is tasked with managing. An institutional analysis should be conducted to identify SCA's strategic role in antiquities preservation, keeping in mind the recommendations presented in this report. This should be followed by an assessment of funds and/or resources needed by SCA and other partners to carry out their duties, which can be used to provide a rationale for adequate budgets proposed within the existing public finance process.

SUMMARY OF NEXT STEPS

Start implementing technical solutions in Luxor; specifically, convert existing sugar cane farms to gated pipe irrigation systems and conduct field studies to design and install a line of groundwater extraction wells. These steps are highest priority because:

- the sites threatened in the Luxor area generate tremendous economic benefits and the impacts are serious;
- the proposed solutions are relatively inexpensive and simple;
- they build upon related work by the APRP project, SWECO, and the Groundwater Research Institute, conducted under the direction of MALR and MWRI;
- MWRI is prepared to help finance irrigation improvements using funds from a World Bank-financed project;
- the potential for a relatively quick reduction in groundwater impacts is high (within 1 year); and
- with modifications, this strategy can be extended to other sites.

The expected benefits of implementing these technical measures include:

- reduction in groundwater impacts on antiquities;
- more efficient use of scarce water resources through reduced applications and use of recycled well water; and
- increased crop yields associated with improved drainage.

Refer to Annex 1 for detailed procedures for contracting the Groundwater Research Institute or another suitable organization to oversee implementation of these technical recommendations.

At the same time, steps should be taken to strengthen institutional capacities for antiquities preservation at the national level, across all relevant ministries. This is necessary to establish shared responsibility and address off-site impacts

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ANNEX 1

OUTLINE OF STEPS INVOLVED IN EXECUTION OF GROUNDWATER INVESTIGATIONS, TEST PUMPING, WELL DESIGN AND MONITORING FOR THE THEBAN BARRIER WELLFIELD

Contractual and financial arrangements should be made for the Groundwater Research Institute (GRI) to conduct the geophysical investigations and modeling described in the report. Upon completion, contracts for the design and supervision of installation of the groundwater extraction wells should be let and the funds allocated for payment of this work. Installation of the well field should begin with a few wells and monitoring bores. After a suitable period of monitoring the operation and results of these first wells (about one year), improvements in the location and design of the remaining wells can be made if necessary and the well field can be completed. These steps are described in more detail below.

Geophysical Investigations

Make the necessary geophysical traverses, approximately six (6) totaling about 9,000 meters, to develop a three-dimensional picture of the depth and physical make-up of the aquifer between the Theban Necropolis and the West bank of the River Nile. The locations, lengths, and methodologies for geophysical traverses can be determined at GRI's discretion. Methods could include resistivity, ground-penetrating radar, and seismic surveys.

Aquifer Testing

From an analysis of the survey results, determine the physical characteristics of the aquifer lying next to and under the Theban Necropolis and select a site for a test well. If possible, this well will be used in the subsequent well field. For this location:

- Specify and install a test well and test pump.
- Install observation wells at suitable distances and depths.
- Conduct pumping tests to determine aquifer and well characteristics (such as Transmissivity, Storage Coefficient, Permeability, and Well-function), as needed for groundwater modeling.

Groundwater Modeling

Use these data in preliminary groundwater model run(s) to determine optimal size, depth, and spacing of well locations and design parameters of the first three drainage wells. After the first three wells have been in use for a full annual hydrologic cycle, use this data to further optimize the well-field parameters before specifying the location and design of the remaining wells.

Well Installation

Provide advice on selection of a drilling company and supervision of installing, developing, and testing the operational drainage wells.

Groundwater Monitoring

Provide advice on location and installation of additional monitoring wells, particularly those in close proximity to the Theban antiquities, to assure sufficient monitoring of the response of the aquifer and to avoid damage to the antiquities.

ANNEX 2

TRANCHE 5 BENCHMARK AND INDICATORS

Benchmark

The GOE will adopt agricultural and environmental policies to preserve excavated and yet to be excavated antiquities.

Background

Egypt is home to 25 percent of the world's antiquities. From Alexandria in the north to the Sudanese border, from Siwa in the west to the Gulf of Aqaba, the country is filled with shrines and temples, pyramids and tombs, ancient villages and monuments. It is difficult to assess the value of cultural heritage; how can one adequately describe the importance of art and sacred places? Yet, Egyptian antiquities are appreciated by people of all nations as cultural heritage of global significance. They are beautiful, awe-inspiring, and powerful. For these reasons, many Egyptian antiquities sites, including the Pyramids, Ancient Thebes, Islamic Cairo, and Nubian Monuments from Abu Simbel to Philae, have been declared UNESCO World Heritage sites. In addition to their value as cultural heritage, Egyptian antiquities are an important economic resource. Millions of tourists come to Egypt each year to visit the Pyramids, the Theban Temples and other antiquities. According to a June 2000 study by the Egyptian Center for Economic Studies (ECES), tourism revenues comprise 4.4 percent of Egypt's GDP (\$3.6 billion). Adding indirect affects increases the contribution to 11.6 percent of GDP, or \$9.6 million. ECES estimates that tourism accounts for 2.7 million jobs, and the sector is fast becoming the greatest source of foreign exchange. As tourism is expected to increase in the coming years, so does the importance of preserving antiquities.

Rising groundwater and encroaching agriculture threaten to destroy or seriously damage many of Egypt's irreplaceable antiquities. Groundwater is in direct contact with temple foundations for extended periods of time, causing structural damage to foundations, columns, and walls, and visible degradation of artistic features. Most threatened at the moment are the antiquities at Thebes, especially Karnak Temple on the East bank and the whole of the Theban Necropolis, a UNESCO World Heritage site covering ten square kilometers on the West Bank. Ancient monuments from Pharonic and Greco-Roman periods are also threatened by rising groundwater elsewhere in the Nile Valley (Abydos), Fayoum Oasis (Medinat Maadi), and the New Valley oases (Beherya and Kharga). Early Christian monuments are also in danger, especially in areas such as Assiut and Qena Governorates. The Director of the American Research Center in Cairo has indicated concern specifically about a land reclamation project near Abydos in Sohag. He also notes that the US Ambassador has established a high level working committee to look into the issue of preserving antiquities from rising groundwater and encroaching agriculture.

APRP has already implemented an activity dealing with this critical issue. APRP has worked with several farmers in the Luxor area to introduce more efficient on-farm irrigation techniques to reduce water applications. In its strategy to conserve scarce water resources, the MMR has inaugurated a campaign, described in RDI report No. 71, Water Savings through Improved

Irrigation in Sugar Cane Cultivation, which, when fully implemented, will reduce water applications to sugar cane dramatically.

The number of Egyptian antiquities is large, they are often located in remote areas, and many are still undiscovered or inadequately inventoried. They are threatened by both on-site and off-site activities. Thus, antiquities preservation must be a shared responsibility. Each private sector firm and public sector agency or company must take responsibility for ensuring that its actions do not result in unacceptable impacts on antiquities. This requires preparation of an environmental impact assessment (EIA) on all proposed projects, to adequately identify potential impacts on antiquities and other environmental impacts before a project is approved.

Policy Issues and Reform Objectives

This benchmark will attempt to solve a common resource economics problem: how to implement policies to promote optimal use of a group of resources -- in this case land, water and Egypt's cultural heritage -- without destroying or significantly diminishing the present and future value of any single resource. This benchmark will improve the capacities of public agencies to conduct environmental impact assessments; specifically, to address potential impacts on antiquities within the EIA process.

In addition to formal inclusion of antiquities in EIAs, following are some of the policies that the Ministry of Agriculture may propose as part of this benchmark:

- Reducing on-farm water applications through more efficient irrigation techniques.
- Altering the cropping pattern away from high water-using crops.
- Establishing adequate buffer zones between antiquities areas and agriculture (restricting land reclamation activities, cultivation, irrigation, and/or crops).
- Installing groundwater extraction wells near antiquities sites to lower the water table and reverse the direction of groundwater flow away from the site.

All of these could be measures to mitigate the negative affects of proposed projects on antiquities, and they should be routinely considered as *means of protecting antiquities*.

Expected Effects

The most important effects of implementation of this benchmark are the following:

- The preservation and possible restoration of Egypt's threatened cultural heritage:
- Increased revenues from tourism, as newly restored sites are made appropriate as tourist sites and existing sites are able to accommodate more tourists.
- Geographic diversification of tourism as antiquities in other parts of the country are excavated and become important tourist sites.
- Increased employment associated with increased tourism. This is of particular importance outside the Luxor region.

Verification indicators

- Develop and obtain approval of detailed instructions for integrating antiquities considerations into EEAA's general EIA guidelines and sectoral EIA guidelines, including guidelines for MALR/GARPAD and the MWRI. This could be presented as an annex to the existing guidelines. It could include an inventory of existing threats at priority antiquities sites, as well as describe the most common potential threats associated with specific land-uses.
- Approve a plan and associated budget for lowering the water table beneath threatened monuments and tombs in the West Bank of Luxor.